

Claims

What is claimed is:

1. Method of charging a rechargeable device, comprising the following steps:

- 5 a) connecting the rechargeable device to a battery connection port and ground;
 - b) feeding a current reference value to a control unit;
 - c) feeding a voltage reference value to the control unit;
 - 10 d) determining a duty cycle in accordance with the current reference value and the voltage reference value fed to the control unit;
 - e) switching, using the duty cycle, an output voltage applied to the rechargeable device
 - 15 between a minimum output voltage and a maximum output voltage dependent on the current reference value and the voltage reference value by means of a charging switch; and
 - 20 f) disconnecting the charged rechargeable device;
- wherein the method further comprises the following step:
- g) connecting an external DC source having an input voltage to an input resistor of a charging apparatus, wherein a transistor
 - 25 voltage drop across the charging switch is minimized in order to reduce a power dissipated by the charging switch -transistor; and that, in step e),
 - h) the duty cycle provided by the control unit is
 - 30 determined by the input voltage and the charging state of the rechargeable device.

2. Method of charging a rechargeable device according to claim 1, wherein a soft switching using the transistor is provided to avoid electromagnetic interference problems.

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3. Method of charging a rechargeable device according to claim 1, wherein an average output voltage between a minimum output voltage and a maximum output voltage is applied to the rechargeable device.

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4. Method of charging a rechargeable device according to claim 1, wherein charging voltages above a voltage level as specified by battery manufacturers for a specific rechargeable device are avoided.

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5. Method of charging a rechargeable device according to claim 1, wherein power dissipated by the input resistor exceeds the power dissipated by the transistor to reduce the power dissipated inside the charging apparatus.

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6. Charging apparatus for charging a rechargeable device, including:

- a) a battery connection port for connecting the rechargeable device to the charging apparatus;
- 25 b) a control unit for the determination a duty cycle in accordance with a current reference value and a voltage reference value fed to the control unit; and
- 30 c) a charging switch for switching according to the duty cycle, an output voltage applied to the rechargeable device between a minimum output voltage and a maximum output voltage

dependent on the current reference value and the voltage reference value,
wherein the charging apparatus further comprises:

- 5 d) an input resistor for connecting an external DC source having an input voltage to the charging apparatus, wherein
 - 10 i) a transistor voltage drop across the charging switch is minimized in order to reduce a power dissipated by the charging switch -transistor;
 - 15 ii) the input resistor is installed separately from the charging apparatus to deposit the power dissipated by the input resistor outside the charging apparatus; and
 - 20 iii) the duty cycle provided by the control unit is determined by the input voltage and the charging state of the rechargeable device.

7. Charging apparatus for charging a rechargeable device according to claim 6, wherein the charging switch is a transistor.

- 25 8. Charging apparatus for charging a rechargeable device according to claim 6, wherein the charging apparatus is connectable to a commercial AC adapter.

- 30 9. Charging apparatus for charging a rechargeable device according to claim 6, wherein the external DC source having an input voltage which is connected to an input resistor of a charging apparatus is a car battery.